Digital Communication Devices Based on Nonlinear Dynamics and Chaos

University of California at San Diego

MURI 98

Web URL: http://rfic.ucsd.edu/chaos

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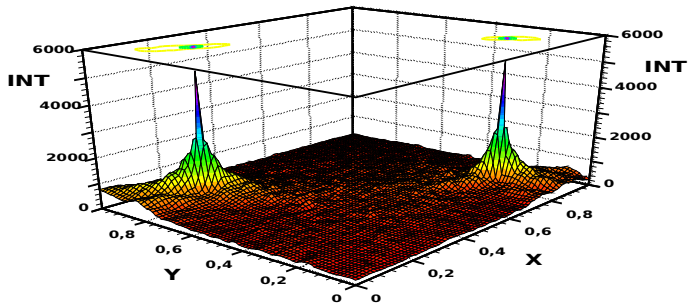

Processing Gain of Chaotic Synchronized Phased Array Antenna Elements in the Presence of Multiple Interfering Sources.

MURI OBJECTIVE

Design simple, strongly nonlinear electronic/optical digital communication devices operating in chaotic regime with minimal control circuitry

DOD CAPABILITIES ENHANCED

- Small, light-weight, low-power transmitters and receivers with much greater bit rates
- Low probability of interception/detection (LPI/LPD)

SCIENTIFIC/TECHNICAL APPROACHES

- Investigate robust chaotically modulated communications techniques
  - Pulse and frequency modulation for wireless
  - Continuous feedback for free-space optical
  - Bit-error rate and multi-user performance analysis of chaotic modulation
  - Control techniques to improve

ACCOMPLISHMENTS

- Developed Viterbi decoding algorithm for symbolic-dynamics-based chaotic modulation
- Excellent agreement obtained between theory, simulations and experimental results in chaotic pulse position modulation electronic comm link
- Developed improved code division multiple access (CDMA) code based on chaotic algorithms
- Developed and demonstrated all optical